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Volume XXIX **Articles 3-4** **Pages 195 to 238**

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3. Evidence of Ice Action in the Teays Valley, West Virginia. By Julian J. Petty 195

4. The Earlier History of the Bulletin of the Scientific Laboratories of Denison University. By Aug. F. Foerste 205

Subject and Author Index 229

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JOURNAL OF THE SCIENTIFIC LABORATORIES OF DENISON UNIVERSITY

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VOLUME 17

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- Notes on Agelacrinidae and Lepadocystinae, with descriptions of Thresherodiscus and Brockocystis; Aug. F. Foerste. 88 pp., 6 plates.

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- The progress of Geology during the period 1891–1915; Frank Carney. 8 pp., 4 figs.
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- Some factors in the geographic distribution of petroleum; Maurice G. Mehl. 9 pp., 2 plates.

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W. C. EBAUGH

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CONTENTS OF VOLUME XXIX

1. The Newer Appalachians of the South (Part I). By Frank J. Wright 1
2. Silurian Cyrtoconic Cephalopods from Ohio, Ontario, and Other Areas. By Aug. F. Foerste 107
3. Evidence of Ice Action in the Teays Valley, West Virginia. By Julian J. Petty 195
4. The Earlier History of the Bulletin of the Scientific Laboratories of Denison University. By Aug. F. Foerste 205
Subject and Author Index 229

DENISON SCIENTIFIC ASSOCIATION

Organized April 16, 1887

REPORT OF THE PERMANENT SECRETARY FOR THE YEAR 1933–1934

Officers of the Association during the college year 1933–1934 were as follows:

T. A. LEWIS, *President*
EDSON RUPP, *Vice-President*
W. C. EBAUGH, *Permanent Secretary and Editor*
CHARLOTTE RICE (*First Semester*)
R. H. HOWE (*Second Semester*), *Recording Secretary and Treasurer*

Meetings of the Association were held semi-monthly, with speakers and topics as follows:

October 17

HER MAJESTY, THE QUEEN—MATHEMATICS. F. B. WILEY, Retiring President

October 31

ELECTRONS, PROTONS, AND OTHER ULTIMATES. L. E. SMITH

November 14

INDUSTRIAL INCOMPATIBLES. W. C. EBAUGH

November 28

GOTHIC, COLORADO—A CITY OF GHOSTS. A. W. LINDSEY

December 12

CHASING THE TIMBERLINE FROM MEXICO TO THE YUKON. W. H. CAMP (Ohio State University)

January 9

THE NATURAL BRIDGE OF VIRGINIA. F. J. WRIGHT

January 30

THE PSYCHOLOGY OF BROADCASTING. JAMES UEBELHART (Station WAIU, Columbus, Ohio)

February 13

SCIENCE REFLECTED IN THE GENEALOGICAL NOVEL. W. A. CHAMBERLIN

February 27

THE REPETITION TENDENCY IN ANIMAL BEHAVIOR. GILBERT V. HAMILTON (Newark, Ohio, Psychopathological Research)

March 13

LIMITATIONS OF SCIENTIFIC METHOD. H. H. TITUS

March 27

PHOTOGRAPHY OF SOLAR PROMINENCES. PAUL BIEFELD

April 17

DEVELOPMENTS IN STAGE LIGHTING. RICHARD WOELLHAF

May 1

THE MAKE-UP OF THE AMERICAN POPULATION. F. G. DETWEILER

May 15

SOME PRACTICAL APPLICATIONS OF DESCRIPTIVE GEOMETRY. A. C. LADNER

The following numbers of the JOURNAL OF THE SCIENTIFIC LABORATORIES OF DENISON UNIVERSITY were published, viz.:

Vol. XXVIII, Article 4, pp. 155–248, October, 1933.

The Ordos Desert of Inner Mongolia; George B. Cressey. 94 pp., 32 figs., 1 plate

Vol. XXIX, Article 1, pp. 1–105, April, 1934.

The Newer Appalachians of the South (Part I); Frank J. Wright. 105 pp., 3 figs., 28 pl.

Thanks are due the Trustees of Denison University, the authors of papers, and certain scientific societies and foundations, for supplying funds to continue the publication of THE JOURNAL. Better financial conditions are hoped for during 1934–1935.

With the year 1935 THE JOURNAL will reach its fiftieth birthday; preparations are already under way for celebrating this anniversary in an appropriate manner.

Respectfully submitted,

W. C. EBAUGH, *Permanent Secretary and Editor*

EVIDENCE OF ICE ACTION IN TEAYS VALLEY, WEST VIRGINIA

JULIAN J. PETTY

Received December 6, 1933; published February 28, 1935

CONTENTS

Introduction 195
Location and Description of Teays Valley 195
Evidence of Ice Action in Teays Valley 198
Striated Cobbles 198
Rafted Cobbles 200
Size of Materials carried by Teays River 201
Conclusion 204

INTRODUCTION

In the past few years striated cobbles have been reported from a number of localities outside of glaciated regions (*2*) (*6*). Several methods of striation have been suggested, among which the action of river ice is most in accord with the facts. That river ice-jams are capable of striating cobbles and boulders has been shown recently by Wentworth (*7*) in his investigations of present-day river ice in Alaska. In the areas from which the striated cobbles have been reported, no other evidence of ice action has been described and, since cobbles may be striated in other ways, the finding of additional evidence of ice action is worthy of record.

It is the purpose of this paper to describe striated cobbles from the stream gravels found in Teays Valley in West Virginia, and to present other evidence of ice action in this ancient stream course.

LOCATION AND DESCRIPTION OF TEAYS VALLEY

Teays Valley is an abandoned stream course which extends from a point on the Kanawha River three miles below St. Albans

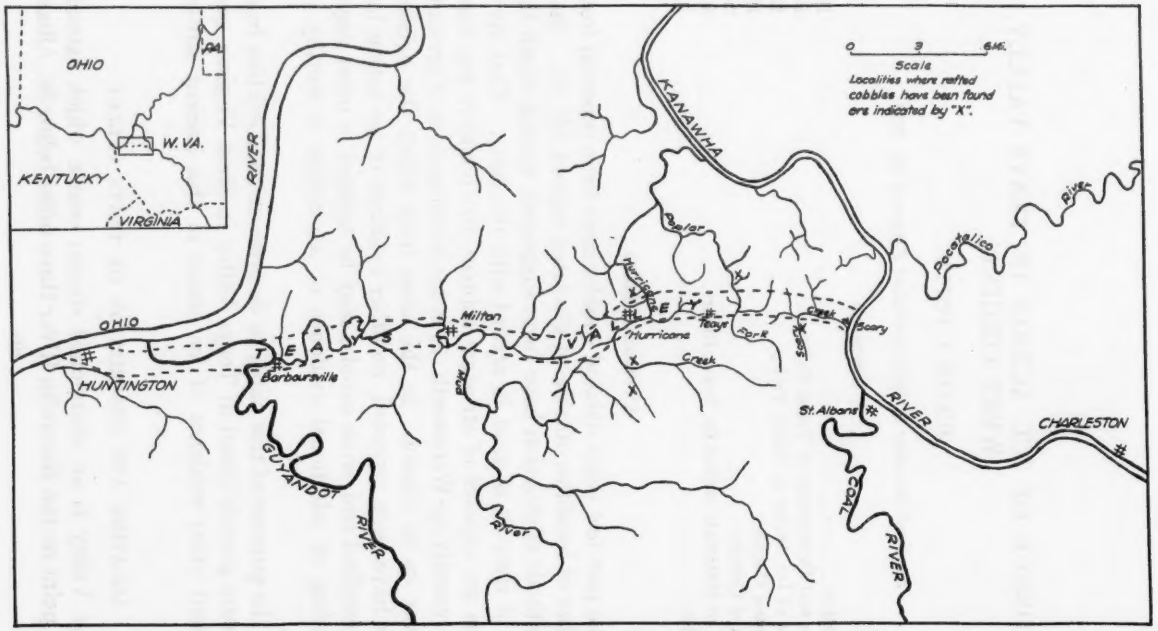

FIG. 1. SKETCH MAP OF TEAYS VALLEY

Localities where rafted cobbles have been found are indicated by x. Index map in upper left corner

to the Ohio River at Huntington. It was recognized as an old river channel by I. C. White (*8*) in 1884, and in 1903 W. G. Tight (*5*) showed the relation of this old valley to the preglacial drainage system of southeastern Ohio and adjacent parts of West Virginia and Kentucky. Teays Valley has a length of about 35 miles and an average width of about one mile. The bottom of the valley is about 200 feet lower than the hill-top elevations adjacent to the valley. Teays Valley is a portion of the course of an ancient river, predecessor of the present Kanawha River. The Flatwoods Valley back of Russell, Kentucky, and California Valley in southern Ohio are also portions of this old river course.

As is shown in detail on the Guyandot, Milton, and St. Albans topographic maps Teays Valley does not now have a throughgoing stream flowing in it. Instead it is drained by several streams flowing in different directions. The accompanying sketch map (Fig. 1) shows the main locational features of Teays Valley.

The rock floor of Teays Valley was covered with a layer of gravel, sand, and laminated silt, which has been mostly removed by erosion, for the present drainage has been cut in places below the level of the rock floor of the old valley. The maximum thickness of the formation, amounting to about 100 feet, is found near Teays. The basal portion of the formation is gravel, which grades upward into a well-rounded, even-grained sand. Together they have a thickness of from 10 to 20 feet. The gravel, in which boulders four or more feet in diameter occur, consists of vein quartz, quartzite, sandstone, and black flint. The quartz and quartzite are generally well-rounded, but the black flint is usually found in angular or subangular blocks.

Above the gravel and sand is a laminated silt, which has a maximum thickness of about 80 feet. The transition from the sand to the silt is usually abrupt, and only at one place, in a cut in the Highlawn Cemetery in Huntington, has the writer found the silt and sand interbedded. These laminated silts are found in tributary valleys outside of the main valley, as for example, in Hurricane Creek south of Hurricane, in Popular Fork north of Mt. Vernon school, and in Rocky Fork Flatwoods east of the

Kanawha River. Stout and Schaaf (*4*), who have recently described a similar silt found in the continuation of Teays Valley in southern Ohio, point out its pecularity in having a high content of potash and alumina. Analyses of the Teays Valley silt show this same high content of potash and alumina.

EVIDENCE OF ICE ACTION IN TEAYS VALLEY

The evidence of ice action in Teays Valley, in addition to the striated cobbles, consists of blocks too large to have been transported by normal stream currents, and the presence of cobbles at points in tributary valleys where they could have been transported only by rafting.

Striated Cobbles

A number of cobbles with striations have been found by the writer in the materials transported and deposited by Teays River, three of which will be described. The proportion of striated cobbles in the gravel is not large, for rather extended search has revealed but a few.

The sandstone cobble shown in Fig. 2 was found in an exposure of the gravel layer in a Cheaspeake and Ohio Railroad cut near Milton. The cobble measures 6 × 4 × 4 inches. Its surface is somewhat rough from weathering except on two faceted faces, on one of which there are three groups of striations. The cobble is probably of local origin.

The cobble illustrated in Fig. 3 is a piece of the Kanawha Black Flint. It is tabular in shape, measuring 6 × 3.5 × 2 inches, and while its surface is irregular, it is smooth and apparently polished. The cobble is striated on two sides, the side with the more distinct striations being shown in Fig. 3.

Another striated cobble of the Kanawha Black Flint is shown in Fig. 4. This cobble measures 10 × 3.5 × 1.5 to 3.5 inches, being decidedly sole-shaped, with one side faceted, polished and striated, while the remaining surface is irregular.

It is believed that river ice action offers the most likely explanation for the striation of these cobbles, especially since other evidence of ice action in the river is at hand. Cobbles may be

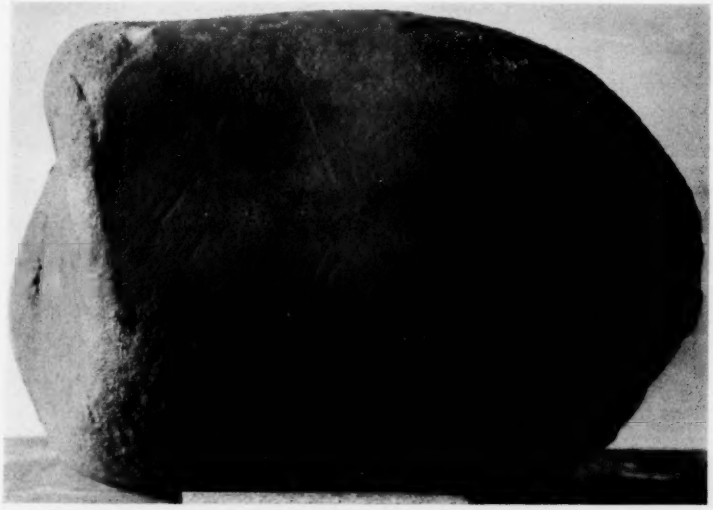

FIG. 2. SANDSTONE COBBLE WITH STRIATIONS

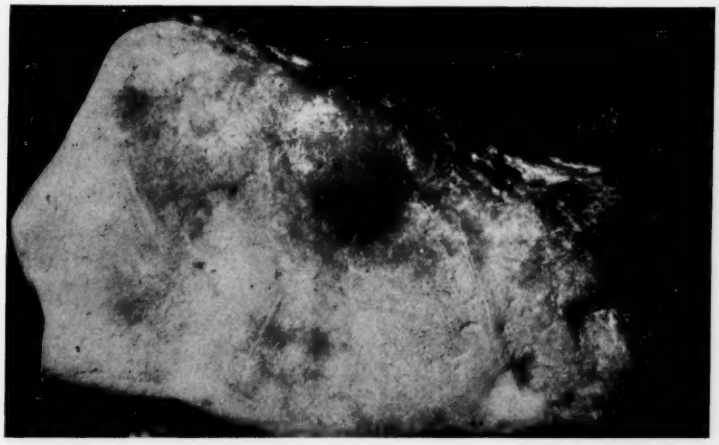

FIG. 3. TABULAR KANAWHA BLACK FLINT COBBLE WITH STRIATIONS

striated through abrasion in mud-flows and landslides, but the outcrop of the flint bed from which the flint cobbles were derived is not far above drainage and the relief is insufficient for landslides of any size. As far as known this area has no faults, so that faulting may also be eliminated as a possible method of striation. Transportation of the striated materials from known glaciated areas involves the difficulty of carrying the materials at least 100 miles upstream and in the opposite direction from the evident source of the black flint.

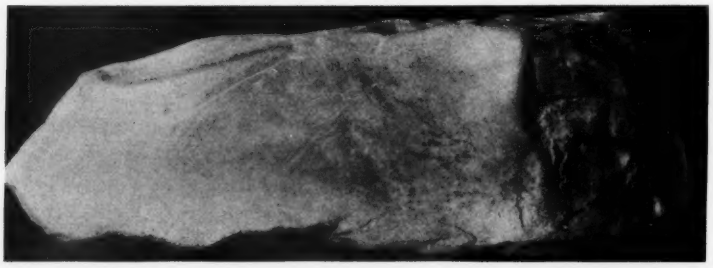

FIG. 4. SOLE-SHAPED KANAWHA BLACK FLINT COBBLE WITH STRIATIONS

Rafted Cobbles

Campbell (*1*) reports finding "a collection of boulders" about three miles south of Hurricane in the valley of Trace Fork. "This bed occurs fully a mile south of the limit of Teay [Teays] Valley and distinctly out of reach of a current of water flowing down the valley." While Campbell does not indicate the composition of these boulders, it is to be inferred that they are typical of those found in the gravel of Teays Valley. This collection of boulders, he argues, could "be explained by floating ice which —drifted into this side valley and discharged its burden of water-worn material."

About 1.5 miles south of Hurricane the Huntington-Charleston highway, U.S. 60, leaves Hurricane Creek to cross a low col to again follow the creek. Where the road crosses this col there is exposed along the road about 30 feet of laminated silt, and be-

neath it are many cobbles of the same composition as those found in the gravels of Teays Valley. These cobbles are foreign to the drainage area of Hurricane Creek; their composition indicates that they come from the drainage basin of Teays River.

In the bed of Scary Creek, fully a half mile from where it enters Teays Valley, a number of cobbles, some weighing several pounds, were found. These cobbles are also foreign to Scary Creek, but are like those found in the gravels of Teays Valley.

A similar occurrence of materals from Teays Valley is to be found in Lick Branch of Poplar Fork. Numerous cobbles of flint, quartzite, and quartz occur on both sides of a col crossed by the road about a mile north of Mt. Vernon school. The col has a filling of about 20 feet of silt beneath which the cobbles occur. The striated cobbles shown in Figs. 3 and 4 were found here. In Poplar Fork south of its entrance to Teays Valley materials of the same character have been found.

About one mile north of the town of Hurricane, a small unnamed east-flowing tributary joins Hurricane Creek. Two quartzite cobbles the size of a man's fist were found about a half mile above the junction of this stream with Hurricane Creek. The quartzite is foreign to the drainage area of this creek, so it must have been carried upstream. Quartzite cobbles are common in the gravels in Teays Valley.

In each of these instances the cobbles have come apparently from the drainage area of Teays River, though they could not have been transported to their present location by that stream. The only plausible explanation is that the cobbles were transported by floating ice which drifted up the valleys and dropped the cobbles on melting.

On the accompanying sketch map (Fig. 1) the localities where rafted materials have been found are indicated by an "X."

Size of Materials carried by Teays River

Additional evidence of ice-rafting is indicated by the size of some of the material carried by Teays River as compared with the size of material transported by the Ohio-Kanawha Rivers at the present time.

The gravel deposit on the rock floor of Teays Valley contains large blocks of local rock, such as are found in the present streams, but the Teays Valley gravels also contain occasional large angular blocks of black flint which have been transported for some distance, and these blocks are often found in a matrix of finer material.

The source of the Kanawha Black Flint cobbles found in the Teays Valley gravel is definitely known, for this bed has been mapped by the West Virginia Geological Survey. "It outcrops over a pentagonal area in Kanawha, Clay, and Nickolas Counties, which measures 60 miles in a northeasterly direction and 24 miles in a southwesterly direction. The city of Charleston is situated at the western-most corner of the pentagon" (*3*). Pieces of this flint are common in the gravel, and since the material is hard they tend to be angular.

In an exposure of the Teays Valley gravel in the eastern part of the city of Huntington, an angular block of the flint fully three feet across was found. This block weighing around 500 pounds has been transported at least 50 miles. The gravel in which it occurs is not well sorted, and is predominantly fine. In the channel of Teays River back of Russell, Kentucky, a rectangular block of flint two feet long was found, and this was also embedded in finer material.

In a road cut about a mile east of Hurricane and several feet above the rock floor of the old valley, the writer found a rectangular block of vein quartz measuring $2 \times 1 \times 1$ feet inbedded in fine and poorly assorted gravel. The block showed no signs of abrasion. It was projecting several inches out of the side of the cut and thus may have been in part removed. This vein quartz must have come from the area of crystalline rocks at the headwaters of New River.

The size of the materials that Teays River could transport by the usual methods of river transportation would of course depend on the gradient and volume of the stream, and neither of these factors can today be determined, though comparisons may be made with present streams in that area.

The rock floor of Teays River at Scary, where the Kanawha River leaves the old valley to flow northward to join the Ohio, has an elevation of about 670 feet, as determined by the elevation of the base of the gravel there. At Huntington the rock floor of the valley has an elevation of about 660 feet, and in the channel back of Russell the elevation is about 655 feet. The river distance from Scary to a point back of Russell is 54 miles, giving a gradient of 3.3 inches per mile. The gradient of present drainage by way of the Kanawha and Ohio Rivers from Scary to Russell, using rock floor elevations as determined by drillings made by the U.S. Engineers and shown on the river charts, is 6.2 inches per mile. Thus the gradient of present drainage is nearly twice that of the old valley drainage.

The occurrence of an angular block three feet across embedded in fine gravel suggests methods of transportation other than normal stream currents. The material under transportation in the Ohio and Kanawha Rivers today is predominantly fine, and operators of dredges state that it is exceptional to find boulders as large as a man's head. Yet the gradient is nearly twice that of Teays River. While a larger volume of water in the old drainage system than in the present would account for increased carrying power there is no other evidence for a larger volume of water in Teays River than in the present Kanawha River.

It might be argued of course that the present gradient of the rock floor of Teays Valley is not the gradient the stream had at the time it carried the materials under discussion; that crustal warping has reduced the gradient since the stream course was abandoned, but from evidence furnished by the silts it would appear that very little, if any, tilting has taken place, for the filling in the old valley is everywhere at approximately the same elevation.

When considered in relation to other evidence of ice action in the ancient river, it would appear that the large blocks occasionally found in the gravel of Teays Valley may have been transported by ice rafting; at the same time cobbles in the gravels were striated.

CONCLUSION

Striated cobbles, which suggest ice action, have been found at several places in Teays Valley. Supplementary evidence of ice action is furnished by the presence of rafted cobbles in the side valleys at points where they could not have been carried by normal stream transportation, and by the presence in the valley of blocks too large to have been transported by Teays River under normal conditions. Ice action must have occurred in Teays River between Kanawha Falls, West Virginia, and Russell, Kentucky, but it was not necessarily restricted to this part of the valley.

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THE EARLIER HISTORY OF THE BULLETIN OF THE SCIENTIFIC LABORATORIES OF DENISON UNIVERSITY

AUGUST F. FOERSTE

The first volume of the Bulletin of the Scientific Laboratories of Denison University was published almost fifty years ago, in December, 1885. Its editor and chief contributor was Clarence Luther Herrick, professor of biology and geology. Although Herrick remained editor during the publication of only the first four volumes, he contributed also to later volumes, and always retained a live interest in the welfare of this bulletin.

The chief incentive leading to the inauguration of this bulletin was Herrick's desire to secure a ready medium for the publication of his own researches, but he planned also to share this opportunity with other investigators, especially with other members of the faculty at Denison, and with the more advanced students at this university. In this connection the following statements regarding Herrick's life, previous to his coming to Denison, are of interest.

Herrick was born near Minneapolis, Minnesota, on June 21, 1858. His father was Henry Nathan Herrick, a Baptist minister. While in the high school at Minneapolis he became strongly interested in natural history, especially in birds and mammals. Among other things, he secured and mounted the skins of one hundred birds, as a contribution to the Museum of the high school. When his father bought him a microscope, for eight dollars, he became so fascinated in the study of the microscopic animal and plant life found in the fresh waters of the vicinity that he became an enthusiastic student in this branch of biology. Later, while at the University of Minnesota, he found that ready access to the literature of biology which he needed for further development, and he began to specialize on the study of micro-

scopic crustacea and on rotifers. He graduated from the University in 1880, having finished his course in three years.

Even before graduation he had published five papers; one on the Trenton Limestone at Minneapolis, another consisting of Ornithological Notes, and three papers on Microscopic Crustacea. Of the latter, one paper was published by the Geological and Natural History Survey of Minnesota in 1879, and consisted of 84 pages of text accompanied by 21 plates, all drawn by himself. Herrick was a skilled artist. His abilities along this line were recognized by the faculty at the University. While connected with the Survey he became familiar with lithographic methods of reproduction on stone, followed later by similar methods of procedure on polished copper plates.

After graduation he worked so hard on microscopic crustacea that in 1884 he published his Final Report on the Crustacea of Minnesota included in the orders Cladocera and Copepoda; together with a synopsis of the described species in North America and Keys to the known species of the more important genera; a report with 192 pages of text and 30 plates, again from his own pen. In the meantime Herrick had spent the scholastic year 1881–1882 at the University of Leipzig, in Germany, and had received his Master of Science degree from the University of Minnesota in 1882.

During the summer of 1884 he was called to the chair of geology and natural history at Denison, and spent the fall of that year in residence at Granville, Ohio. The early part of 1885 he worked with the Minnesota Survey upon a report on the mammals of that state. During this time also he translated and published Outlines of Psychology: Dictations from lectures by Hermann Lotze, with the addition of a chapter on the Anatomy of the Brain; at that time quite a novel combination. This publication included 150 pages of text and 2 plates. Herrick, during his stay in Germany, had become much attracted by the teachings of Hermann Lotze, a German philosopher at Göttingen, who was much opposed to the materialism at that time in vogue in Germany.

From these notes it is evident that Herrick, at the time of his

entry on regular duty at Denison University in the fall of 1885, when he moved to Granville with his family, though only 27 years old, was already a zoologist of note, and an investigator of varied interests. He at once plunged into a continuation of his scientific researches and soon began to realize that his activities in Ohio would not lead to ready publication in Minnesota. Therefore, the publication of a journal of science at Denison originated in his mind.

In planning for such a publication Herrick was confronted with the cost of printing and the expense of engraving the plates of illustrations. Cheap printing was secured by taking advantage of the facilities presented by a small printing establishment already in operation at Granville. The chief work of this establishment was the printing of the local village weekly newspaper, with a side line on hand-bills and general advertisements. Here it was arranged that the printing of the Bulletin of the Scientific Laboratories of Denison University was to progress only during periods when the demands of the newspaper did not have precedence. The head to this firm, W. H. Kussmaul, was greatly interested in the publication of the Bulletin, and until the time of his death took great pleasure in reminiscing about the old days when the reading of galley and page proofs had to be rushed to take advantage of a chance to use the printing press on a few more pages of the Bulletin.

The expense of engraving the plates was solved by Herrick's engraving them himself. At first Herrick did all the work himself, but later, especially after he had left Denison for a time, it was done by W. G. Tight, Herrick's favorite pupil, and later his associate as a member of the faculty. A photographic and engraving department was established at Denison, and served not only to facilitate the engraving of the plates needed by the Bulletin, but also to instruct in this art those students who foresaw the value of a knowledge of this method of reproduction. The plates accompanying Ulrich's article on Waverlyan bryozoans in volume 4 of the Bulletin were lithographed and printed by himself. Those accompanying Foerste's articles on fossils in the first three volumes of the Bulletin were photoengraved on

zinc. The chief point was the fact that engraving most of the plates used in the Bulletin at Granville obviated a great part of the expense which would have had to be met if this engraving had been done by commerical firms

Even under these favorable circumstances the publication of the Bulletin presented difficulties. The University contributed money as far as its means permitted. Herrick always contributed freely. More than once members of the faculty assisted. Several times a large part of the expense was borne by liberal Baptists at Dayton, and occasionally others at Cleveland and Columbus helped. Herrick always remained sanguine. Nothing could destroy his faith in his ultimate success.

The first volume of the Bulletin appeared in December, 1885. It was called the Bulletin of the Scientific Laboratories of Denison University. Beginning with the third number of volume 19, this name, in order to conform with a new rule of the postal authorities, was changed to the Denison University Bulletin, Journal of the Scientific Laboratories. During the publication of volume 4, in order to give the Bulletin a wider interest than that indicated by the word *scientific,* the name was broadened temporarily to the Bulletin of Denison University.

This first volume had only two contributors: Prof. C. L. Herrick and August F. Foerste. Herrick contributed three fifths of the text. Foerste at that time was a sophomore at Denison, but was 23 years old. Herrick's contributions were in the line of his former scientific interests. There was a brief article on a bird, and three articles on microscopic freshwater animals, chiefly crustacea. Foerste's articles also reflected former interests.

Foerste was born in Dayton, Ohio, May 7, 1862. In his first year in high school he became so strongly interested in flowering plants that before graduating he had accumulated an herbarium of 1000 species within a radius of 10 miles of Dayton, the distance within which he could both walk and collect within one day. In his senior year at high school he became acquainted with Arthur P. Morgan, the botanist, at that time the principal of one of the public schools of the city. Morgan had a large herbarium covering many parts of the United States, and also an excellent library,

especially on systematic botany. Morgan's home was the place of meeting of all the local botanists on Saturday afternoons. Here they showed their new finds and found a means of comparing their specimens with authentically identified forms. Here Foerste, though only a boy, was made welcome.

While still in high school, Foerste heard a lecture delivered by Edward Orton, the geologist, at that time president of Ohio State University as well as professor of geology. He then learned for the first time the meaning of the word "fossil," that fossils were common in the vicinity of Dayton, and that some had been described from the Soldiers Home, three miles west of central Dayton. Within a week an unexpected package arrived from Orton containing the first two volumes on the Paleontology of Ohio and the first three on its Geology, all at that time published by the Geological Survey of Ohio. The next year he spent almost daily in the quarry at the Soldiers Home and at other localities in the vicinity of Dayton. During the three years following his graduation from high school he taught a small country school a mile and a half east of Centerville, 10 miles south of Dayton, and boarded within a quarter of a mile of the large quarry at which the same strata as those at the Soldiers Home were exposed. As a result, even before entering Denison University, Foerste had a large collection of fossils from the strata then known as the Clinton, and later discriminated as the Brassfield.

When Herrick first came to Denison, in the fall of 1884, Foerste, then in his sophomore year, had become acquainted with the best fossil collecting localities in the vicinity of Granville. Though Herrick was four years older the two soon found common interest in the local fossils and took trips together. During one of their trips to Flint Ridge, in the eastern part of Licking County, Herrick broached the question of a new journal of science, to be published at Denison, and invited Foerste to be a contributor. Foerste drew his plates, one on superposed buds in plants, and two on Brassfield fossils, during the summer of 1885, and they were ready when Herrick returned in the fall of 1885 for his permanent location at Denison. Herrick soon became active in making plans for the printing of the Bulletin and

in securing financial support. The printing proceeded slowly, with Foerste as a frequent proof reader. The first volume made its appearance in December, 1885.

During the summer of 1886 Herrick organized what he intended to be a summer school for the more advanced students in science at Denison University. He called this the Summer Laboratory Session of the University. The first summer was spent on Michipicoten Bay, on the Northeastern shore of Lake Superior, in Canadian territory, and was devoted chiefly to the study of the igneous and metamorphic rocks there exposed. At Leipzig Herrick had studied under Zirkel, and the study of igneous rocks in this section greatly interested him. The object of the school was not so much original research as an effort to permit the student to become acquainted with igneous rocks *in situ*, these rocks occurring only as glacial erratics in Ohio. The results of this undertaking pleased Herrick so much that he hoped to repeat the experiment during the summer of 1887 with studies in biology on the coast of the Gulf of Mexico and also in the mountainous area of Alabama. However, these plans fell through, though Herrick took his trip to the Gulf of Mexico, collecting marine crustacea on Mobile Bay and in neighboring areas.

The Denison Scientific Association was organized by Herrick on April 16, 1887. There were 27 charter members, of whom five were members of the faculty. In the following list the names of those who at that time were on the faculty are italicised. Ten of the charter members later contributed to the pages of the Bulletin, the volumes to which they contributed being indicated in brackets. In this list W. H. Herrick and C. J. Herrick were brothers of C. L. Herrick. William Funk Cooper, a young brother-in-law of C. L. Herrick, was at that time in the public school of Granville, and too young to be a member of the association, though later he became a contributor to the Bulletin. In the following list of charter members, the names of those on the faculty at Denison are printed in italics, those contributing to the Bulletin are starred, and the volumes in which their contributions appear are indicated.

Charter Members of the Denison Scientific Association

L. E. Akins (2)
Charles T. Atwell
E. H. Castle
W. E. Castle
W. H. Cathcart
Charles Chandler (4)
E. S. Clark
A. D. Cole (5, 8, 9, 11)
E. A. Deming
*J. L. Deming (3)
*August F. Foerste (1, 2, 3)
*C. J. Herrick (6, 12, 13)
C. L. Herrick (1, 2, 3, 4, 5, 6, 11)
W. H. Herrick
C. R. Hervey
W. H. Johnson
C. P. Jones
*H. L. Jones (2, 5, 7, 8)
T. A. Jones
D. E. Munroe
*C. L. Payne (3, 4)
Enoch Price
George D. Shepardson
John Thorne
*W. G. Tight (2, 4, 5, 6, 8, 9)
A. T. Von Shulz
J. E. Woodland

The first regular meeting of the Denison Scientific Association took place one week after its organization, on April 23, 1887. The first paper read was that on the Geology and Lithology of Michipicoten Bay, Lake Superior, by C. L. Herrick, W. G. Tight, and H. L. Jones, members of the Summer Laboratory session of 1886. Later this paper was published in the Bulletin.

The second volume of the Bulletin was published in May, 1887. In this volume Herrick published the first of his series of papers on the Geology of Licking County, Ohio, devoted chiefly to the study of the stratigraphy and paleontology of the Waverlyan and lower Pennsylvanian strata of that area. To the series of articles on this subject published in volume 2 Herrick was the chief contributor, but Foerste added a short paper on Flint Ridge bryozoa. This series was continued in volumes 3, 4, and 5, Ulrich and Cooper contributing papers to the last two. It forms Herrick's most important contribution to the geology of Ohio.

Five other papers were included in volume 2. Two of these continued the series by Foerste on the Clinton (Brassfield) Group of Ohio. A third was that paper, already mentioned, on the Geology and Lithology of Michipicoten Bay, Lake Superior, by Herrick, Tight and Jones. Prof. L. E. Akins contributed a short paper on the Horizontal Component of the Earth's Magnetic

Force, and H. L. Jones supplied a brief list of the algae collected near Granville.

In October, 1887, Herrick published his Contributions to the fauna of the Gulf of Mexico and the South, List of the Freshwater and Marine Crustacea of Alabama, with description of new species and synoptical tables for identification. This is the paper resulting from his studies of the crustacea in Mobile Bay and vicinity, already mentioned. The chief point of interest in the present connection is that it was published simultaneously as vol. 1, no. 1, of the Memoirs of the Denison Scientific Association and as vol. 5, bull. no. 1, of the Geological Survey of Alabama, the printing in both issues being done at Granville. No further numbers of the Memoirs ever were published. The plan of inaugurating a series of Memoirs fell through.

Volume 3 of the Bulletin was published in April, 1888. Herrick again was chief contributor, continuing his series on the Geology of Licking County. Foerste finished his series on the Clinton (Brassfield) Group of Ohio and added a paper on miscellaneous Palaeozoic Fossils, chiefly from New South Wales, Australia. Charles L. Payne contributed a paper on Cross-fertilization in Plants, and J. L. Deming gave a list of diatoms in the vicinity of Granville.

Volume 4 of the Bulletin was published in December, 1888. Its subject matter was divided into two parts, the first dealing with Laboratory Results, the second being Educational and Literary. In the first part Herrick continued his series on the Geology of Licking County. To this series, E. O. Ulrich, already recognized as the foremost student of Palaeozoic Bryozoa, contributed a paper on the Bryozoa of the Waverly Group of Ohio. W. F. Cooper compiled a list of the Waverly Fossils of Ohio. G. F. Richards, who was interested in petrography, wrote a paper discussing Contact phenomena among igneous rocks in South Carolina. Tight noted the presence of hydra in local waters, and Payne added to the list of algae known from the vicinity of Granville. Cooper at that time was a student of Doane Academy, a school preparatory for Denison, but Ulrich

was the first contributor to the Bulletin among those not connected in any way with Denison.

The chief innovation of volume 4 consisted in the introduction of papers entirely outside of the field of scientific investigation. Dr. C. J. Baldwin, at that time pastor of the Baptist church at Granville, wrote a paper on the Personal Element in Education. Prof. Charles Chandler discussed the Pronunciation of Latin and Quasi-Latin Scientific Terms. Prof. George F. McKibben, professor of modern languages, wrote on the German poet and naturalist Adelbert von Chamisso, as Naturalist and Philologist. Of special interest in this series is Herrick's contribution on Lotze's Ontology—the Problem of Being. This was Herrick's second effort to bring the philosophy of Lotze to the more general attention of English speaking people, Herrick's translation of Lotze's Outlines of Psychology having been published in Minneapolis in 1885. Later in life Herrick frequently returned to philosophical studies, especially during his second connection with Denison, in 1892 and 1893, and during his last years in New Mexico.

In 1889 Professor Herrick left Denison to become Professor of Biology at the University of Cincinnati, but returned to Denison in the fall of 1892. In the meantime his former student, W. G. Tight, had become his successor, not only on the faculty but also as editor of the Bulletin. Volume 5 of this Bulletin did not make its appearance until June, 1890. Its publication was financed by four members of the First Baptist Church at Dayton, Ohio, by Prof. C. L. Herrick, then at the University of Cincinnati, and by professors Cole, McKibben, Jones, and Johnson, who not only were members of the faculty but also members of the Denison Scientific Association.

The chief paper in this volume was one on the Central Nervous System of Rodents, by Professors C. L. Herrick and W. G. Tight. This had been preceded in January of the same year by a paper entitled Notes upon the Brain of the Alligator, published by C. L. Herrick and his brother, C. J. Herrick; this led eventually to the founding of the Journal of Comparative Neurology by

C. L. Herrick, while the latter for a few years was professor of zoology at the University of Cincinnati. Other papers in volume 5 of the Bulletin included two papers on the Waverly by W. F. Cooper, three of biological interest by W. G. Tight, four on physical apparatus by A. D. Cole, one by H. L. Jones on Flowers blossoming in Winter, and one by Mrs. J. E. Dixson, at that time librarian of the University, on the Flowering of the Date Palm.

Volume 6 of the Bulletin was issued in two parts. Part 1 was published in May, 1891. The chief contribution to this volume was the one of the Neurology of the Porcupine and Pocket Gopher, by C. J. Herrick, at that time an undergraduate student at the University of Cincinnati. This paper was preceded by one of more general interest by C. L. Herrick and C. J. Herrick, on the Living Habits of the Porcupine, Pocket Gopher, and Musk Rat, all three being rodents. These papers are the first contributions by C. J. Herrick on the subject of neurology, a subject to which he devoted himself for the remainder of his academic life. Only recently he retired from active service as professor in the University of Chicago. W. G. Tight contributed a paper on the Crushing Effect of Ice where impinging on rock walls forming the sides of preglacial valleys. From this time on Tight remained interested in preglacial valleys, especially in connection with drainage changes, his earlier publications on that subject appearing in the Bulletin.

Part 2 of volume 6, published in January, 1892, contained a paper on the Neurology of the Opossum, by C. L. Herrick, and a paper on Microscopic Fresh-water Crustacea and Rotifers by C. H. Turner.

Volume 7 of the Bulletin was published in March, 1892, and consisted solely of a Catalogue of the Flowering Plants and Ferns of Licking County, Ohio, by Herbert L. Jones. Jones was a graduate of Denison, but at the time of the publication of this Catalogue he was assistant in botany at Harvard University, later became professor at Oberlin.

Part 1 of volume 8 of the Bulletin was published in May, 1893. The first article of this part consisted of additional notes of

Fresh-water Crustacea and Rotifers of the Cincinnati Area by C. H. Turner, formerly of the University of Cincinnati, but who in the mean time had become professor of biology at Clark University, a college for colored people at Atlanta, Georgia. This was followed by a French poem of the twelfth century, paraphrasing the Forty-fifth Psalm, and edited by Prof. George F. McKibben. A short note on a method of making lantern slides, by W. G. Tight, concluded this part.

Part 2 of this volume was published in May, 1894. Here C. H. Turner made his final contribution on microscopic crustacea. During the following year, in 1895, he was co-author with C. L. Herrick in their Synopsis of the Entomostraca of Minnesota, with descriptions of related species, comprising all known forms from the United States included in the orders Copepoda, Cladocera, Ostrocoda, published in the Zoological Series of the Geological and Natural History Survey of Minnesota, at that time a monumental work. H. L. Jones added to and amended parts of his Catalogue of flowering plants and ferns already published in volume 7. A. D. Cole discussed the use of electricity as a "laboratory servant."

But the chief innovation made in volume 8 was in an article by W. G. Tight entitled A Contribution to the Knowledge of the Preglacial Drainage of Ohio. This was the first of a series of articles by Tight, Fowke, Leverett, Davis, Clark, and Scheffel, distributed in volumes 8 to 13, dealing with the changes of preglacial drainage in central and southern Ohio, culminating finally in Tight's important monograph on Drainage Modifications in southeastern Ohio and adjacent parts of West Virginia and Kentucky, published as Professional Paper no. 13 by the U. S. Geological Survey, in 1903, after Tight had become president of the University of New Mexico.

Part 1 of volume 9 was published in December, 1895. It included two papers on the preglacial drainage of Ohio; that by Gerard Fowke discussed observations made in Ross County, and that by Tight considered the area along Paint Creek, in Pike and Highland Counties and farther westward. W. F. Cooper gave a general account of the Paleozoic Formations of America. J.

Orrin R. Fisher supplied a List of Lichens found in Licking County, Ohio.

Part 2 of volume 9 was published in March, 1897, and contained three papers on preglacial drainage in Ohio. Frank Leverett, one of the leading students of glacial deposits in America, discussed Drainage Changes in south-central Ohio. W. G. Tight had two papers; one on Preglacial Drainage in south-central Ohio, the other on that of Fairfield County, south of Licking County. A. D. Cole contributed a paper on Electric Waves in long parallel Wires, and W. E. Wells, a graduate student, discussed the Preparation of Wax Models from microscopic Sections.

Volume 10 was published in August, 1897. The entire volume was devoted to a discussion of the scientific department of Denison University, its organization, faculty, curriculum, and other features. The occasion was the dedication of the recently constructed Barney Science Hall, a gift of one of the Dayton Baptists.

Volume 11, consisting of 11 articles, was published in 9 parts, most of these containing only a single contribution. The first part was issued in March, 1898, and the last in June, 1902. Among these contributions, two continued the study of the preglacial drainage of Ohio. The one by Gerard Fowke (March, 1898) was a study of the Preglacial Drainage in the Vicinity of Cincinnati; the other, by H. J. Davis (March, 1899), a graduate student at Denison, considered a Modification in the Jonathan Creek drainage Basin, in Muskingum, Perry, and Licking Counties, Ohio. John A. Bownocker (May, 1898), who already held his doctorate in science from Ohio State University, discussed the Palaeontology and Stratigraphy of the Corniferous (Middle Devonian) rocks of Ohio. James S. Hine (February, 1901), a professor of entomology at Ohio State University, contributed an article on the Panorpidae (a family of neuropteroid insects) of America, north of Mexico. A. D. Cole (February, 1902), who by this time had become professor of physics at Ohio State University, discussed his experiences with the capillary electrometer. The remaining six papers of this volume were contributed by writers who at that time were in New Mexico.

Dr. C. L. Herrick, then President of the University of New Mexico (December, 1898), contributed two papers on the geology of New Mexico. A third geological paper, on the Geology of the Albuquerque sheet (June, 1900), was written by C. L. Herrick in association with Douglas W. Johnson, since become a famous physiographer. Johnson, a former student at Denison, at that time was field assistant on the University Geological Survey of New Mexico, and graduated from that university in 1901. Another paper, written by C. L. Herrick, in collaboration with John Terry and H. N. Herrick (January, 1899), consisted of Notes on a Collection of Lizards from New Mexico. This paper was prepared by the "junior authors" under the direction of C. L. Herrick, while they were in the last year of their preparatory course at the University of New Mexico, at Albuquerque. The paper resulted from laboratory work in a course of natural history. H. N. Herrick, a son of C. L. Herrick, writes: "We had no interest in lizards other than the natural tendency of boys to 'collect' anything available. Cigarette cards were not known in those days. So we caught lizards." (In a letter to the writer.) T. D. A. Cockerell, at that time professor of entomology in the Agricultural College of New Mexico (November, 1898), prepared Tables for the Determination of New Mexico Bees. John Weinzirl, professor at the University of New Mexico (March, 1899), discussed the Effect of Bacteria in Cheese.

In the mean time the editorship of the Bulletin had changed. Tight still was editor of almost all parts of the Bulletin, but in 1901 he became President of the University of New Mexico, taking the place of C. L. Herrick, who had resigned on account of ill health. The title page of the completed volume bears the names of both W. G. Tight and W. W. Stockberger as editors.

Volume 12 of the Bulletin consisted of 11 articles, all but two published as separate articles, dating between June, 1902 and August, 1904. W. W. Stockberger remained editor until July, 1903. He was instructor in botany at Denison in the years 1901–1903. In the latter year he became an expert in histology in the bureau of plant industry in the U. S. Department of Agriculture, and his place as editor was taken by Thomas L. Watson, who

was professor of geology at Denison during the years 1901–1904. During the summer of 1902 he was connected with the Geological Survey of Georgia, and the following year with that of North Carolina. In consequence, the greater part of volume 12 is occupied by 6 contributions by Watson on the mineral and ore deposits in these two states (August, 1902; July, 1903; March, 1904; and August, 1904). Prof. C. J. Herrick, at that time at Denison, contributed two articles on the neurology of fishes (December, 1902; July, 1903). W. Blair Clark, a graduate of Denison, but at that time instructor in chemistry, contributed an article on Drainage Modifications in Knox, Licking, and Coshocton Counties of Ohio (June, 1902). In addition there was a list of the Birds of Licking County, by I. A. Field, a graduate of Denison, but at that time a student at Harvard (December, 1903); and a short article on a deformed chick by Lyndon M. Hill (October, 1902), a student under C. H. Turner at Clark University.

Charles Henry Turner was born in Cincinnati, Ohio, on February 3, 1867. He was the son of a colored janitor at a local church. He studied at the University of Cincinnati under C. L. Herrick, taking his B.S. degree in 1891, and his M.S. degree in 1892. Later, in 1907, he received the Ph.D. degree from the University of Chicago. At Cincinnati, Turner was a classmate of C. J. Herrick who states in a letter to the writer: "I think that the consensus of the class would be that Turner was its most able member. He published several neurological papers while still an undergraduate student of the University of Cincinnati, and one year, I believe, devoted himself to computation at the Cincinnati Observatory." He was assistant in biology at Cincinnati in the scholastic years 1890–1892, professor of biology at Clark University, Atlanta, Georgia, during the years 1892–1905, and then was connected with two other institutions before he became teacher of biology in one of the high schools at St. Louis, Missouri in 1908, where he remained until his death in 1923. His experiences at Clark University were not pleasant. It was a small sectarian college of low grade, under white management,

and the people in control did not appreciate his exceptional abilities as a scientist.

In 1904 Watson became professor of geology at the Virginia Polytechnic Institute, and his place as editor of the Bulletin was taken by Clark W. Chamberlin, a graduate of Denison, at that time professor of physics, and later President of the University.

Volume 13 of the Bulletin consisted of 8 articles, published in 4 parts, between January, 1905, and September, 1907. The first part, published in January, 1905, was devoted entirely to a consideration of Clarence Luther Herrick as a man, teacher, and scientist. Herrick had died on September 15, 1904, at Socorro, New Mexico, after a long illness. Part 2, containing the paper on The Central Gustatory Paths in the Brains of Bony Fishes, by C. J. Herrick, was published in September, 1905. Part 3, on the Geology of Perry Township, in Licking County, Ohio, by Frank Carney, professor of geology at Denison, included some notes on drainage changes in the eastern part of this county. Part 4, published in September, 1907, included 3 papers on drainage changes in Licking County, two by Frank Carney, and one by Earl R. Sheffel, a graduate of Denison, at that time preparing for an M.S. degree.

Barney Science Hall burned during the spring vacation of 1905. The files of the Bulletin were stored there, and most of the earlier volumes, preceding volume 14, were destroyed. With the publication of volume 14, under the editorship of Frank Carney, the size of the page of the Bulletin was enlarged, the printing was done by the Waverly Press, at Baltimore, most illustrations were engraved by the half tone process, and the Bulletin secured a new lease on life. These notes are confined to the first 13 volumes of the Bulletin.

A résumé of these 13 volumes shows that in the number of pages of text involved, the Bulletin was concerned chiefly with biological and geological subjects; the number of pages by these two equalling 93 percent of the total, 37 percent being of biological interest and 56 percent of a geological character. In fact, if those pages devoted to paleontology be classified as biological,

the percentage of biological material is greatly increased. Of the subjects here included as biological, those of botanical character occupy 177 pages; the zoological ones, 221 pages; and the neurological ones, 252 pages. It should be remembered, however, that most of the botanical material consists of lists of various kinds of plants found in Licking County. Among pages devoted to zoological subjects, those on fresh-water animals, chiefly microscopic crustacea, number 66 pages. Among geological subjects, those devoted to paleontology and stratigraphical geology occupy 653 pages, by far the greater number of these being paleontological. Mineral and ore deposits are discussed on 193 pages, and preglacial drainage on 129 pages. Of the so-called exact sciences, physics occupies only 37 pages, and chemistry none. Modern and ancient languages receive 30 pages, and all other subjects, not classified, a total of 54 pages.

As to the number of pages contributed by individual authors, including only those authors who contributed 20 or more pages of text, Prof. C. L. Herrick occupied a total of 564 pages, 377 of these being on paleontology and geology, 112 pages on neurology, and 75 pages on zoology. C. J. Herrick contributed 160 pages on neurology. Tight contributed 158 pages, of which 54 were on preglacial drainage. Foerste contributed 167 pages, chiefly on paleontology. Jones, contributed 132 pages, chiefly on botany. Watson contributed 132 pages on mineral and ore deposits. D. W. Johnson in association with C. L. Herrick contributed 63 pages on the geology of New Mexico, Carney, in later years a generous contributor to the Bulletin, contributed 39 pages on geology. Ulrich, Turner, Cole, Cooper, and Fowke, each contributed between 20 and 36 pages.

The following is an alphabetical list of contributors to the Bulletin, the number of the volume in which their contributions appear being indicated directly after the name. Those graduating from Denison are indicated by the word "Denison," followed by the year of graduation.

Contributors to first 13 volumes of the Bulletin

L. E. Akins—vol. 2 (Denison '78; instructor Prep. Dept., '79–'00; studied in Edinburgh, Scotland in '85–'86).

C. J. Baldwin—vol. 4 (Pastor of Baptist church in Granville).
H. Heath Bowden—vol. 13 (Denison '93; instructor '96–'97).
J. A. Bownocker—vol. 11 (Ohio State Univ. '89; prof. '98–'28).
Frank Carney—vol. 13 (Professor at Denison, '04–'17).
Charles Chandler—vol. 4 (Professor at Denison '74–'91).
W. Blair Clark—vol. 12 (Denison '97; instructor '98–'04).
T. D. A. Cockerell—vol. 11 (Entomologist at Agricultural Expt. Stn., New Mexico).
A. D. Cole—vols. 5, 8, 9, 11 (Professor at Denison '85–'01; Ohio State Univ., '08–'28).
William Funk Cooper—vols. 4, 5, 9 (undergraduate at Denison '94–'95; '00–'01).
Homer J. Davis—vol. 11 (Denison '97).
J. L. Deming—vol. 3 (Non-graduate student at Denison '86–'88).
Mrs. J. E. Dixson—vol. 5 (Librarian at Denison until 1891).
I. A. Field—vol. 12 (Denison '03).
J. Orrin Fisher—vol. 9 (Denison '93).
August F. Foerste—vols. 1, 2, 3 (Denison '87).
Gerard Fowke—vols. 9, 11 (Ohio State University).
C. J. Herrick—vols. 6, 12, 13 (Denison undergraduate '86–'89, Cincinnati Univ. '91; Denison prof. '98–'07).
C. L. Herrick—vols. 1, 2, 3, 4, 5, 6, 11 (Professor at Denison, '85–'89; '92–'95; Univ. of Cincinnati '89–'92; Pres. Univ. New Mexico '97–'01).
H. N. Herrick, Jr.—vol. 11 (Univ. of New Mexico undergraduate, Univ. of California '07).
Lyndon M. Hill—vol. 12 (Clark Univ. Atlanta, Georgia, student '02).
James S. Hine—vol. 11 (Ohio State University, '93; prof. '94–'30).
Douglas W. Johnson—vol. 11 (Denison undergraduate '96–'98; Univ. of New Mexico '01; Univ. Geol. Survey of New Mexico, '99–'01).
H. L. Jones—vols. 2, 5, 7, 8 (Denison '86; Granville Academy Instructor '88–'91).
Frank Leverett—vol. 9 (U. S. Geological Survey).
George F. McKibben—vols. 4, 8 (Denison '75; professor '76–'79; '82–'33).
Charles L. Payne—vols. 3, 4 (Denison '88).
Gary F. Richards—vols. 1, 2, 3 (Denison '87).
Earl Read Scheffel—vol. 13 (Denison '07).
John Terry—vol. 11 (Univ. of New Mexico student; Univ. of California '07).
W. G. Tight—vols. 2, 4, 5, 6, 8, 9 (Denison '86; Professor '90–'01; pres. Univ. of New Mexico, 1901–1910).
C. H. Turner—vols. 6, 8 (Univ. of Cincinnati '91; ass't., '90–'92; Clark Univ., '92–'05).
E. O. Ulrich—vol. 4 (Paleontologist at Newport, Kentucky).
T. L. Watson—vol. 12 (Professor at Denison, '01–'04).
John Weinzirl—vol. 11 (Professor at Univ. of New Mexico, '98–'07).
W. E. Wells—vol. 9 (nongraduate student at Denison).

The Bulletin served several purposes. The most obvious of these was the provision of a means of publication of the results

of research by both members of the faculty and by the more advanced students. In the second place, it called the favorable attention of scientists all over the world to Denison as an institution of research; research at that time was confined chiefly to the large institutions of learning. In the third place, by its system of exchange of publications with other institutions it provided a means of accumulating much highly desirable scientific literature in many languages and from all parts of the world.

In volume 5 of the Bulletin, published in 1890, the list of exchanges included 57 foreign institutions, in addition to 17 in the United States. In volume 10, published in 1897, this list had increased to 75 foreign institution, in addition to 69 in the United States.

In this manner Denison not only brought its own researches to the attention of the world, but was able to keep in touch with the scientific research of others in widely distant areas. Later, the geological library of Denison was greatly increased by the purchase of the private library of G. E. Gilbert, one of the most eminent geologists of his day.

The Bulletin was not the only publication started by Herrick while at Denison. The Bulletin served chiefly for the publication of shorter papers. For other contributions, especially those accompanied by large sized plates, a larger format seemed desirable. Hence a series of memoirs was proposed, but only one was ever printed.

Herrick's first contribution on the anatomy of the brain was printed in 1885 as an appendix to a translation of Hermann Lotze's Outlines of Psychology. Additional papers on the nervous system appeared in 1889 (Cincinnati Lancet-Clinic), in 1890 (Journal of the Cincinnati Society of Natural History, the Microscope, and the Bulletin of the Scientific Laboratories of Denison University), and in 1891 (Anatomische Anzeiger, Science, and again in the Bulletin). Herrick soon recognized that at the rate at which his manuscripts on the anatomy of the nervous system were accumulating he needed a special medium of publication. This led to the inauguration of the Journal of Comparative Neurology, a private project, started in 1891, while

Herrick was professor of zoology at the University of Cincinnati. H. H. Bawden, his biographer, said of this publication:

> "The founding of this Journal can best be designated as a piece of characteristic audacity. It was a purely private enterprise, with no fund to defray the expenses and very little outside coöperation promised. But without counting the cost he plunged boldly in, expecting a constituency to be developed as the work went on. In this he was not disappointed, though recognition of financial needs lagged sadly behind that of the scientific value of the Journal."

To the first volume of this Journal Herrick contributed 6 papers and 2 brief notes. When Herrick returned to Denison, in the fall of 1892, the publication of this Journal was removed to Granville, and the Journal received official support from the University. In 1894, when C. L. Herrick removed to New Mexico, on account of ill health, his brother, C. J. Herrick became managing editor and has been in control ever since.

When Herrick returned to Denison in 1892 he became interested in the idea of a publication at Denison which should include also contributions of more general interest. This bore fruit in the publication of the Denison Quarterly, of which W. H. Johnson was the managing editor, with professors G. F. McKibben, L. E. Akins, and W. A. Chamberlin as associates. Herrick's great interest in this publication is shown by his contribution of 4 papers to the first volume, under the title: The Scope and Methods of Comparative Psychology. To volume 4, while living in New Mexico, Herrick contributed a philosophical paper on The Critics of Monism. The first number of this Quarterly was published in January of 1893. Four numbers appeared each year for a period of 4 years, the last issue being in December of 1896.

During December of 1893 Herrick had a severe attack of grip, and soon his lungs became so seriously infected that in the spring of 1894 he moved to central New Mexico, living chiefly at Albuquerque and Socorro. As far as possible he led an open air life and became interested in the fauna, flora, and geology of New Mexico. In 1897 he became president of the territorial Uni-

versity of New Mexico. Soon a University Geological Survey was organized, and Herrick began to feel the urge toward publication. There was at that time a Hadley Climatological Laboratory, and he persuaded its organization to undertake the publication of a Bulletin. Publication began in 1898, with Herrick as the editor. He contributed to the first volume a series of papers on the Geology of New Mexico. Other papers appeared in this Bulletin, some of these published also in the Bulletin at Denison. Only three volumes of the Bulletin of the Hadley Climatological Laboratory appeared. The third volume was edited by John Weinzirl.

During these years Douglas W. Johnson made his appearance in New Mexico. During the scholastic years 1896–1898 he had been a student in Denison University. From 1899–1901 he was a student at the University of New Mexico, and at the same time on the University Geological Survey of that state. A paper on the Geology of the Albuquerque Sheet, by Herrick and Johnson appeared in both the Bulletin of the Hadley Climatological Laboratory and in the Bulletin published at Denison University. Johnson graduated from the University of New Mexico in 1901. In the same year Herrick gave up his position at the University. He had become too ill to continue in the service, so he returned again to an open air life. During the earlier half of 1904 he was active in the publication of papers of geological interest. He died on September 15, 1904 at Socorro. The first number of vol. 13 of the Bulletin of the Scientific Laboratories of Denison University, published in January, 1905, was devoted to a review of his life. Another obituary, by W. G. Tight, was published in the first number of volume 36 of the American Geologist in the same year.

Prof. W. E. Castle, of Harvard University, once stated:

"While in conversation with a zoologist from a distant state I was asked from what college I came. I replied, 'From a college of which very likely you never heard, Denison.' 'Oh yes,' was the prompt reply. 'I know of Denison; the Herricks have made Denison famous.' This incident gives evidence of the high regard in which the scientific work

begun at Denison by Prof. C. L. Herrick is held among workers elsewhere in similar lines of research."

There were two Herricks. The second, of course, is Charles Judson Herrick, a brother of Clarence Luther Herrick, but 10 years younger. Both were born at Minneapolis.

When C. L. Herrick came to Denison, C. J. Herrick came with him. He was a student at Denison during the scholastic years 1886–1889, but when Luther Herrick went to the University of Cincinnati in the fall of 1889, Judson Herrick followed him, and graduated from that institution in 1891. He served as instructor of natural science at Granville Academy during the year 1891–1892, then at Ottawa University (Kansas) during the year 1892–1893. Returning to Denison he was fellow in biology during the years 1893–95, and instructor during 1895–96. Two years later he came back to Denison as professor of zoology, and occupied this position from 1898 to 1907, when he went to the University of Chicago. He has remained there ever since. His first studies on neurology appeared in 1892 in volume 6 of the Bulletin of the Scientific Laboratories of Denison University. Later papers appeared in volumes 12 and 13, while he was still at Denison. In 1894, when Luther Herrick moved to New Mexico, Judson Herrick became managing editor of the Journal of Comparative Neurology and has been in control ever since. His chief lines of research have been on the nerve components of vertebrates, the anatomy of the brain of fishes and amphibians, and the evolution of the cerebral cortex. He is one of the leading neurologists of America.

W. H. Herrick, whose name appears in the list of charter members of the Denison Scientific Association, was another brother, eight years younger than Luther. He attended Denison several years, belonging to the class of 1892, but never graduated. Later he became a surveyor and civil engineer at Socorro, New Mexico, and died there on June 24, 1921.

William Funk Cooper, who contributed to the Bulletin in volumes 4, 5, and 9, was a brother-in-law of C. L. Herrick. He accompanied the latter to Granville in 1885, attended public

school there for 3 years, and Doane Academy during the collegiate year 1888–1889. In 1894 he attended the University for 2 terms and did the same in 1900, but never graduated. In 1888, James Hall, the noted paleontologist, visited Granville, and during the following summer Cooper spent a month collecting Waverly fossils for Hall. In 1891 Cooper went to Albany, New York, and worked in Hall's museum and laboratory for over two and a half years, putting Hall's collections in order. In 1899, he went to Lansing, Michigan, and during the following 10 years was connected with the Geological Survey of Michigan. He is still living at Lansing.

Next to C. J. Herrick, the one most instrumental in keeping the Bulletin alive during its earlier years, was Herrick's pupil, W. G. Tight, later his follower both in the faculty and as editor of the Bulletin.

William George Tight was born on a farm near Granville, Ohio, on March 12, 1865. He graduated from Denison in 1886. Having become very enthusiastic about geology and biology under the influence of C. L. Herrick, he remained at Denison another year, thus becoming one of the first two post-graduate students at that University. In 1890 he became instructor in geology, and remained on the faculty in connection with geology and biology until 1901, when he resigned to become president of the University of New Mexico, in place of C. L. Herrick who had resigned from that position on account of illness. During the summer of 1888, and again during the winter of 1893, Tight was at Harvard, where, under the influence of William Morris Davis, he became greatly interested in the problem of drainage changes. In southern Ohio he found abundant evidences of such changes, and contributed papers on this subject to volumes 8 and 9 of the Bulletin and to other publications, between the years 1894 and 1901; these culminated in 1903 in his paper on Drainage Modifications in Southeastern Ohio and Adjacent Parts of West Virginia and Kentucky, published by the U. S. Geological Survey as Professional Paper no. 13, which is a monument to his memory.

The two brothers, Clarence Luther Herrick and Charles Judson

Herrick, though both eminent scientists were very different in their natural dispositions.

C. L. Herrick, primarily a zoologist, was attracted strongly by every field of natural science with which he came in contact. At first it was zoology, then paleontology, then neurology, and finally psychology and philosophy, with side trips into microscopic petrography and botany. He frequently would carry on several lines of research almost simultaneously. At all times he was very much alive, very enthusiastic, very earnest, and honest, as well as optimistic. He did not allow himself to be defeated by difficulties. He was an ideal man for a small college, and would have done honor to a large one. He aroused enthusiasm for research in his students and put into them the urge for publication. He spread himself over many fields of investigation and secured eminence in all.

C. J. Herrick, on the contrary, was the specialist, devoting all his life to a single subject, the field of neurology. In 1903, when C. J. Herrick was 35 years old and C. L. Herrick was 45, C. J. Herrick was listed as 39, and C. L. Herrick was listed as 113 in a total of 150 zoologists selected in that year for a list of Leading Men of Science in the United States in 1903, in order of distinction in each science. In the same list, C. J. Herrick ranked as 5 in a total of 25 eminent anatomists.

This, of course, does not determine a man's real value to science, but it illustrates very well the modern need of specialization if a man is to secure the highest recognition in a given field. In recent years the specialist has come to supersede the general student of natural history in importance in research. Those students of Denison were fortunate who, in the years 1892–1893, had the good fortune to come under the influence of both the Herricks.

SUBJECT AND AUTHOR INDEX

Actinoceras cf. richardsoni 115
Akins, L. E 211, 220, 223
Alabama, Geological Survey 212
Allegheny Front 5, 8, 9, 17, 34, 36, 37, 42, 47, 50, 52, 54
Allegheny Mountain 16, 60
Appalachian Highlands 5, 12, 46
Appalachian Plateau 5, 12, 17, 19
Appalachian Ridges 5, 9, 12, 17, 23, 25, 34, 36, 42, 45, 70
Appalachian Valley 5, 8, 9, 19, 23
Amphicyrtoceras bownockeri 115, 152, 158, 161
grimsbyense 153
laterale 150, 157, 158, 161
orcas 151, 157, 163
orcas latum 155
pettiti 154, 155, 157
reedsi 158
sauridens 161
tantalum 115, 167
welchi 115, 159
williamsi 118, 158, 160
Anomeioceras compressum 145, 146
percurvatum 146
vicinum 146
Apiocystites canadensis 116
Apsidoceras insigne 191
Armenoceras hearsti 181
magnum 181
richardsoni 116, 181
Atrypa reticularis 113
Atwell, Charles T 211
Austinoceras turgidulum 115, 139, 140

Back Creek 53
Balcony Falls, Va 31, 32, 43, 49, 78
Baldwin, C. J 213, 221
Barney Science Hall 216, 219
Bawden, H. Heath 221, 223
Beaverdam Creek 47, 48
Beloitoceras 119
Berkeley Springs, W. Va 26
Berryville, Va 40, 41, 71

Birds, chiefly of Licking county 208, 218
Blacksburg, Va 58
Blue Ridge 12, 27, 31, 32, 33, 45, 47, 48, 49, 69, 77
Blue Ridge Province 4, 8
Bownocker, J. A. 216, 221
Brassfield group of Ohio 209, 211, 212
See Clinton group of Ohio
Broadway, Va 30
Browntown Cove 30
Bryn Mawr berm 26
Buchanan, Va 77, 80, 82, 86, 89
Buffalo Creek 77, 86, 97
Bulletin of the Hadley Climatological Laboratory 224
Bulletin of the Scientific Laboratories of Denison University
Difficulties of publication 207
Volume 1 ..... 205, 208, 209, 210
Contents, *see* under Birds, Crustacea, Education, Fossils and Geology, Insects, Latin, Minerals Ores and Petrography, Neurology, Philosophy and Psychology, Physics, Plants, Preglacial Drainage, Rotifers
Contributors to 220, 221
Exchange Lists 222
Byronoceras longidomum 141
radiciforme 141

Carney, Frank 219, 220, 221
Cascades Creek 91, 94, 95, 100, 101
Castle, E. H. 211
Castle, W. E. 211, 224
Cathcart, W. H. 211
Cedar Creek 32, 75, 77, 78, 79, 83, 84, 88, 89, 90, 92, 100, 101
Chamberlain, Clark W. 219
Chamberlin, W. A 223
Chamisso, Adelbert von 213
Chandler, Charles 211, 213, 221
Charles Town, W. Va 26, 27
Cincinnati, Univ. of 213, 214, 215
Clark, E. S. 211
Clark, W. Blair 215, 218, 221
Clark University 215, 218
Clifton Forge, Va 49
Clintonville, W. Va 36, 37
Cockerell, T. D. A 217, 221
Cole, A. D 211, 213, 214, 215, 216, 220, 221
Contents of Denison Bulletin 219, 220
Cooper, William Funk 210, 211, 212, 214, 215, 220, 221, 225
Crustacea, chiefly freshwater 206, 208, 212, 214, 215
Cumberland, Md. 26, 46
Cycloceras 117

Cycloceras austini 114
junciforme 114
Cyrtoceras arcticameratum 110, 169, 170
brevicorne 124, 125
clitus 116, 130
corydon 116, 132
fosteri 122
heteroclytum 139
lucillum 123
minneapolis 118
orodes 125, 136
uranus 167
Cyrtorizoceras cedarvillense 119
curvicameratum 120
falciforme 115, 120
fosteri 115, 122, 124
lucillum 123
williamsi 118, 123

Dalmanella elegantula 113
Davis, Homer J 215, 216, 221
Davis, William Morris 226
Dawsonoceras 117
Dawsonoceras americanum 118
hyatti 114
Deming, E. A 211
Deming, J. L 211, 212, 221
Denison Quarterly 223
Denison Scientific Association 210, 211, 213
Charter members of 211
Memoir of 212
Deposits in Discosorus 179
Dinorthis subquadrata 113
Discosorus austini 174, 180
biconoideus 115, 183
borealis 171
conoideus 170–173, 175, 176
deposits in 179
ehlersi 173, 175, 176
gracilis 181
halli 171, 173, 176
humei 179
lyonsense 178
perexpansum 175
regularis 171
remotus 179
Dixson, Mrs. J. E 214, 221
Donacoceras 182
Durbin, W. Va 17, 36, 52, 54

Ectocyrtoceras 118
Ectocyrtoceras billingsi 147, 150
gibberosum 115, 147, 148
marginatum 146
thales 147, 149, 151
wilmingtonense 115, 147
Editors of Denison Bulletin, Journal of Scientific Laboratories
Herrick, C. L 205
Tight, W. G 213, 217
Stockberger, W. W 217
Watson, Thomas L 217, 219
Chamberlain, Clark W 219
Carney, Frank 219
Education 213
Ekwanoceras austini 115, 125, 126
breviconicum 125, 126
Elkton, Va 31
Elliott Knob 15
Elrodoceras sp. (Wilmington) 115
Endodiscosorus foerstei 180, 182
Euryrizoceras anguloseptatum 115, 143
chadwicki 139, 142
percurvatum 115, 139, 143, 144

Field, I. A 218, 221
Fisher, J. Orrin 216, 221
Foerste, Aug. F 207, 208, 211, 212, 220, 221
Fort Valley 29
Fossils and Geology
Australia 212
Clinton (= Brassfield) of Ohio 209, 211, 212
Corniferous (Columbus) of Ohio 216
Waverlyan and Pennsylvanian of Licking county 211, 212, 214
Fowke, Gerard 215, 216, 220, 221
French 215
Front Royal, Va 28, 29, 30, 45

Galtoceras arcticameratum 118, 169
ruedemanni 170
Geisonoceras 117
rochesterense 118
Gilbert, G. C. library purchased 222
Giles, A. W 11, 13
Gilmore Mills 84, 90, 101
Glasgow, Va 81, 96
Gonatocyrtoceras heteroclytum 139
inflatum 141
Goniophora 109

Gooney's Creek 29, 30
Graftonoceras ortoni 115
Greenbrier River 36, 37, 50, 52, 53, 56
Greenbrier River basin 34, 52
Grimsbyoceras 118
clitus 129, 130, 131, 133
corydon 129, 132
genuiflexum 115, 129, 133
hillsboroense 115, 129, 135
orodes 118, 136
teucer 129, 131, 133

Hadley Climatological Laboratory 224
Hall, James 226
Hancock, Md. 26
Harpers Ferry, W. Va 19, 23, 26, 27, 31
Harrisburg cyle 7, 18, 62
Harrisburg peneplane 6, 18, 23, 24, 25, 62, 63, 64, 79, 80
Harrisonburg, Va. 30, 41, 42, 70
Herrick, C. Judson 210, 211, 213, 214, 218, 219, 220, 221, 223, 225, 227
Herrick, Clarence L. . 205–211–213, 214, 215, 217, 219, 220, 221, 222, 223, 224, 227
Herrick, C. L.
Obituary of, by A. D. Cole (vol. 13) 219
H. H. Bawden (vol. 13) 219, 223
W. G. Tight 224
Herrick, H. N. 217, 221
Herrick, W. H. 210, 211, 225
Herricks, The Two 224, 225, 227
Hervey, C. R. 211
Hexameroceras compressum 115
hertzeri 115
Highbridge Church 79, 82, 87, 98, 100
Hill, Lyndon M. 218, 221
Hine, James S 216, 221
Hubbard and Croneis 11, 13
Huronia 109, 113
chicottensis 110
hopkintonensis 115
obliqua 110, 115
subcylindrica 115
turbinata 115
vertebralis 109, 110, 115
Huroniella 116

Ice Action 195–204
Insects 216, 217
Intermediate peneplane 18
Iron Gate 49

Jackson River 32, 49
James River 7, 8, 17, 31, 32, 38, 39, 44, 45, 49, 50, 51, 77, 79, 80, 84
James River basin 16, 17, 31, 49, 57
Johnson, Douglas W 217, 220, 221
Johnson, W. H 211, 213, 223
Jones, C. P 211
Jones, H. L 211, 212, 213, 214, 215, 220, 221
Jones, T. A 211
Journal of Comparative Neurology 213, 222
Journal of the Scientific Laboratories of Denison University
See under Bulletin of Sci. Lab. Denison Univ.

Kayoceras 109, 115
biconoideum 183
thomasi 186
Kionoceras 117, 118
austini 115
myrice 115
Kussmaul, W. H 207

Lace Falls 100
Latin 213
Lechritrochoceras lentedilatatum 115
Leipzig University 206
Leptaena rhomboidalis 113
Leverett, Frank 215, 216, 221
Lewisburg Lowland 35, 71
Lewisburg, W. Va 35, 36, 42
Lexington, Va 73, 77
Licking county .....
Birds of 218
Geology of 211, 212, 214, 219
Plants 212, 214, 215
Lingula 113
Lizards of New Mexico 217
Lotze, Hermann 206, 213, 222
Lunice Creek 24
Luray quadrangle 29
Luray, Va 30, 31, 45, 48

Maelonoceras arcticameratum 123
Mandaloceras 189
austini 115, 187
bohemicum 187
Marlinton, W. Va 35, 36, 42, 53
Massamitten Mountain 9, 15, 16, 28, 29, 30, 40, 41, 48, 49, 60
McKibben, George 213, 215, 221, 223
Megalomus 108, 109, 110, 113

Memoir of the Denison Scientific Association..... 212
Metaspyroceras ruedemanni..... 115
Michipicoten Bay, Geology of..... 210, 211
Minerals, Ores, and Petrography
Michipicoten Bay..... 210, 211
Georgia, North and South Carolina..... 212, 218
Minnesota, Geol. and Nat. Hist. Survey of..... 206, 215
Mobile Bay, C. L. Herrick at..... 210, 212
Mole Hill..... 21
Monomorella 108, 109, 113
noveboracum..... 110
prisca..... 109, 110, 116
Moorefield, W. Va..... 24, 25, 57
Monroe, D. E..... 211
Monterey, Va..... 16, 60
Morgan, Arthur P..... 208
Mount Crawford, Va..... 59

Narthecoceras crassisiphonatum..... 182
Natural Bridge..... 32, 71, 73, 77, 79, 83, 84, 86, 93, 100, 101
Natural Bridge Station..... 80, 83, 89
Natural Chimneys..... 70
Nautilus wilmingtonensis..... 115
Neurology..... 213, 214, 218, 219
New Market, Va..... 30, 48
New Mexico, Univ. of..... 217
New Mexico, Univ. Geol. Surv. of..... 217, 224
New River..... 8, 11, 16, 23, 33, 34, 38, 39, 42, 44, 45, 51, 52, 58, 65, 70
New River basin..... 17, 33, 51
Newer Appalachians..... 5, 8, 9, 13, 14
Newer Appalachians of the South. Part I. Between the Potomac and New Rivers..... 1
North Branch of Potomac River..... 24, 46
North Fork of Shenandoah River..... 15, 28, 29, 30, 45
North Mountain..... 15
North River..... 77, 97
Northern Appalachians..... 7, 10

Obituary of Herrick
Bawden, H. H. (vol. 13)..... 219, 224
Cole, A. D. (vol. 13)..... 219, 224
Tight, W. G..... 224
Ohio State University..... 209, 216
Older Appalachians..... 5, 8, 9, 14, 19
Oncoceras orcas..... 151
pettiti..... 116, 153, 155
teucer..... 116, 131
thales..... 116, 149, 151

Ophidioceras wilmingtonense 115
Orthoceras alienoides 114
annulatum 116, 117
brontes 116, 117
cadmus 116, 117
cancellatum 117, 118
imbricatum 117, 118
infelix 179
moodiense 114
oberon 116, 117
penecillum 114
pylades 116, 117
remus 116, 117
subcancellatum 117, 118
undulatum 117, 118
varro 116, 117
whitfieldi 114
wilmingtonense 114
Orton, Edward 209

Patterson Creek 24
Pawpaw, W. Va 44
Payne, C. L 211, 212, 221
Pedlar Hills 67, 68
Pentameroceras mirum 115
Pentamerus oblongus 113
peeblesensis 111
Petersburg, W. Va 25, 56
Petty, Julian J., Evidence of Ice Action in Teays Valley, West Virginia .. 195–204
Philosophy and Psychology 213, 223
Phragmoceras colliciare 115
cuneiforme 115
ellipticum 115
hillsboroense 115
parvum 115
sp. (Peebles) 115
wilmingtonense 115
Physics 211, 214, 215, 216
Piedmont 8, 12, 19
Piedmont peneplane 27, 28, 30, 32, 33
Plank Road 81, 82, 86, 87, 88, 97, 98
Plants, chiefly of Licking county 209, 212, 214, 215, 216, 217
Port Republic, Va 42
Poterioceras 160
sauridens 161
Potomac River 7, 26, 27, 40, 44, 45, 47, 48, 50
Potomac River basin 24, 46, 47
Preglacial Drainage 214, 215, 216, 218, 219

Price, Enoch 211
Proetus 113
Pulaski, Va 34
Pycnostylus 109

Rafted Cobbles 200, 201
Reger, D. B 13
Rhipidomella hybrida 113
Rhomboceras welchi 115, 165, 166
Richards, Gary F 212, 221
Riverton, Va 41
Roanoke River 7, 33, 38, 45, 50, 51, 58, 61, 62
Roanoke River Basin 33
Roanoke, Va 33, 61, 69
Romney, W. Va 25, 57
Rotifers
in vol. 1 (Herrick) 208
in vol. 6 (Turner) 214
Round Hill 21

Salem, Va 33, 50, 67
Sallings Mountain 32, 78, 79, 82, 86, 96, 97, 98, 99, 101
Scheffel, Earl Read 215, 219, 221
Schooley cycle 10, 13
Schooley peneplane 6, 7, 10, 14, 16, 17
Schuchertella subplana 113
Shenandoah River 26, 27, 28, 31, 38, 41, 47, 48, 57
Shenandoah Valley 22, 48
Shepardson, George D 211
Shepherdstown berm 26
Short Hills 59, 77, 91, 92, 97, 98
Sounding Knob 15
South Branch of Potomac River 56
South Fork of Shenandoah River 30, 45
Southern Appalachians 5, 6, 7, 8, 19, 20, 80
Staunton, Va 31
Stenogomphoceras chadwicki 118
ignotum 115, 189
inflatum 189
sp. (Wilmington) 115, 190
Stockberger, W. W 217
Stokesoceras engadinense 173, 180, 181
romingeri 181
Stose, Geo. W 8, 10, 13, 20, 63, 64
Strasburg, Va 28, 45
Streptoceras 118
heros 116, 162, 163, 164
Janus 116, 161, 162

Striated Cobbles 198–200
Summer Laboratory Session of Denison Univ 210, 211
Summit peneplane 10, 11, 12, 13

Teays Valley 195, 204
Tennessee River 45
Terry, John 217, 221
Thorne, John 211
Tight, W. G 207, 211, 212, 213, 214, 215, 216, 217, 220, 221, 224, 226
Trimerella 108, 109, 113
Trimerella acuminata 109, 116
ohioensis 109, 115, 116
Trochoceras mccharlesi 191
Turner, C. H 214, 215, 218, 220, 221

Ulrich, E. O 207, 211, 212, 220, 221
Union, W. Va 42
University Geological Survey of New Mexico 217, 224
Uranoceras perdistensum 115, 168
uranus 167
U. S. Geological Survey 215, 226

Valley of Virginia 8
Von Shulz, A. T 211

Watson, T. L 217, 219, 220, 221
Waverly Press 219
Weinzirl, John 217, 221, 224
Wells, W. E 216, 221
Williamsport, Md 26
Wilsonoceras mccharlesi 191
Winchester, Va 25, 28, 40, 41
Woodland, J. E 211
Woodstock, Va 45, 59
Woodward, H. P 11, 13
Worthenoceras crooki 129
elongatum 127
racinense 127
subfusiforme 115, 127, 128
Wright, Frank J. Newer Appalachians of the South (Part I) 1

Zirkel, Ferdinand 210

Some suggested experiments for the graphic recording of speech vibrations; Robert James Kellogg. 14 pp., 6 figs.
The manipulation of the telescopic alidade in geologic mapping; Kirtley F. Mather. 46 pp., 13 figs.
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Articles 9–12, pp. 147–224; May, 1920.....$0.75
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